

CLAIMS

1. An exhaust gas purifying catalyst comprising:
a monolithic substrate;
a HC adsorbing layer for adsorbing hydrocarbons (HC),
5 said HC adsorbing layer containing zeolite and being formed on said monolithic substrate;
a catalytic layer for producing hydrogen (H₂) and reducing NO_x, said catalytic layer functioning to produce hydrogen (H₂) from at least one of hydrocarbons and carbon monoxide (CO) and to
10 reduce nitrogen oxides (NO_x) with the produced hydrogen and at least one of hydrocarbons and carbon monoxide in exhaust gas, said catalytic layer being formed on said HC adsorbing layer.
2. An exhaust gas purifying catalyst as claimed in Claim 1,
15 wherein said exhaust gas purifying catalyst is for purifying exhaust gas discharged from an internal combustion engine, wherein said HC adsorbing layer contains zeolite and functions to adsorb hydrocarbons during a cold operation of the engine and to release adsorbed hydrocarbons during a warm-up operation of the engine,
20 wherein said catalytic layer functions to produce hydrogen from hydrocarbons released from said HC adsorbing layer and from at least one of hydrocarbons and carbon monoxide discharged from the engine after the warm-up operation and to reduce NO_x with produced hydrogen and at least hydrocarbons and carbon monoxide
25 in exhaust gas.
3. An exhaust gas purifying catalyst as claimed in Claim 1 or 2, wherein said catalytic layer contains a H₂ producing catalyst component for functioning to produce hydrocarbons, and a NO_x reducing catalyst component for functioning to reduce nitrogen
30 oxides, said H₂ producing catalyst component being disposed on said HC adsorbing layer and including a HC reforming catalyst component functioning to reform hydrocarbons so as to produce

hydrogen and a CO reforming catalyst component functioning to make steam reforming of carbon monoxide, said HC reforming catalyst component containing cerium oxide carrying palladium, said CO reforming catalyst component containing zirconium oxide carrying rhodium.

4. An exhaust gas purifying catalyst as claimed in any of Claims 1 to 3, wherein said catalytic layer further includes an upstream layer formed at an upstream section of said exhaust gas purifying catalyst, said upstream section being located upstream of said HC reforming catalyst component layer and said CO reforming catalyst component layer relative to flow direction of exhaust gas, said upstream layer containing alumina carrying palladium.

5. An exhaust gas purifying catalyst as claimed in any of Claims 1 to 4, wherein said zirconium oxide carrying rhodium contains alkaline earth and has a composition represented by the following formula (A):



where X is an alkaline earth metal selected from the group consisting of magnesium, calcium, strontium and barium; a and b are ratios of atoms of elements; and c is a number of oxygen atoms required for satisfying valences of X and Zr, in which a is within a range of from 0.01 to 0.5, b is within a range of from 0.5 to 0.99, and $a+b = 1.0$.

6. An exhaust gas purifying catalyst as claimed in any of Claims 1 to 5, wherein a NOx reducing catalyst component functioning to reduce nitrogen oxides is contained in at least one of said HC adsorbing layer, said HC reforming layer, said CO reforming layer and said upstream layer containing alumina carrying palladium.

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7. An exhaust gas purifying catalyst as claimed in any of Claims 1 to 6, wherein a NO_x reducing catalyst component functioning to reduce nitrogen oxides is contained in at least one of said HC adsorbing layer, said HC reforming layer, said CO reforming layer and said upstream layer containing alumina carrying palladium, said NO_x reducing catalyst component containing at least one selected from the group consisting of palladium, platinum, rhodium, alumina, alkali metal and alkaline earth metal.
8. An exhaust gas purifying catalyst as claimed in any of Claims 1 to 7, wherein said zeolite contains H-type β -zeolite having a Si/2Al ratio ranging from 10 to 500.
9. An exhaust gas purifying catalyst as claimed in any of Claims 1 to 8, wherein said zeolite contains H-type β -zeolite and at least one of MFI, Y-type zeolite, USY-type zeolite and mordenite.
10. An exhaust gas purifying catalyst as claimed in any of Claims 1 to 9, wherein said zeolite contains at least one selected from the group consisting of palladium, magnesium, calcium, strontium, barium, silver, yttrium, lanthanum, cerium, neodymium, phosphorus, boron and zirconium.
11. An exhaust gas purifying catalyst as claimed in any of Claims 1 to 10, wherein a NO_x reducing catalyst component functioning to reduce nitrogen oxides is contained in at least one of said HC adsorbing layer, said HC reforming layer, said CO reforming layer and said upstream layer containing alumina carrying palladium, said NO_x reducing catalyst component containing at least one selected from the group consisting of alkali metal and alkaline earth metal, said NO_x reducing catalyst

at least one of hydrocarbons and carbon monoxide in exhaust gas, said catalytic layer being formed on said HC adsorbing layer; and

- 5 > a device for controlling combustion in the engine to produce exhaust gas, to be brought into contact with said catalytic layer, having a composition meeting a relation [(a concentration of hydrogen / a concentration of total reducing components) ≥ 0.3].

16. A method of producing an exhaust gas purifying catalyst, comprising:

- 10 preparing a monolithic substrate;
forming a HC adsorbing layer on said monolithic layer, to adsorb hydrocarbons (HC); and
forming a catalytic layer on said HC adsorbing layer, to produce hydrogen (H₂) and reduce NO_x, said catalytic layer
15 functioning to produce hydrogen (H₂) from at least one of hydrocarbons and carbon monoxide (CO) and to reduce nitrogen oxides (NO_x) with the produced hydrogen and at least one of hydrocarbons and carbon monoxide in exhaust gas.

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